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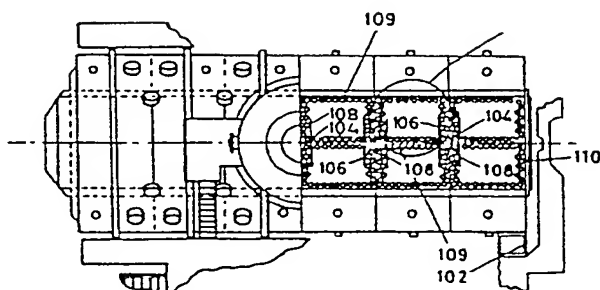
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**Continuous pan crystallizer.**

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The invention concerns a continuous pan crystallizer which is conventional in that it has a number of interleading compartments with cross-over ports through which the massecuite passes from compartment to compartment. The cross-over ports have baffles on one or both sides thereof to direct the massecuite up the tubes between the baffles and the walls of the compartments in order to avoid short-circuiting or by pass of massecuite from one compartment to another.

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"Continuous pan Crystallizer"

This invention relates to continuous vacuum pan crystallizers.

5 Most continuous pans are divided into a number of compartments in an attempt to promote plug flow through the system. It is important that the flow system approach plug flow as closely as possible, so that crystal residence times in the continuous pan are uniform, leading to equal growth on all crystals and a uniform crystal size in the product massecuite leaving  
10 the pan.

One of the objects of the present invention is to provide a system for massecuite to pass from one compartment to another in such a way as to eliminate problems experienced with other types of continuous  
15 pans, such as:

- (a) short-circuiting or by-passing of massecuite from one compartment to another.
- (b) elimination of encrustation in the opening between compartments.

In order to overcome the latter problem, steam blowers needed to be installed in some pans at the cross-over ports, to prevent encrustation in the ports. This is expensive and detrimental to thermal economy.

5 Another object of the invention is to eliminate encrustation of sugar on baffles and other surfaces inside the pan. Such encrustation can lead to the formation of lumps or the dislodging of large pieces of encrustation which can block heating tubes or massecuite  
10 outlets.

A further object is to provide a condenser integral with the pan to reduce the cost of the continuous vacuum pan system.

15 According to the invention a continuous pan crystalliser includes a plurality of compartments, baffles being provided on either or both sides of the cross-over ports and arranged for the massecuite moving in the direction of the cross-over ports to pass up through the tubes between the baffles and the walls of the compartments.

20 The massecuite must, therefore, have had at least one pass through the tubes before leaving a compartment. Massecuite which passes through the cross-over port is directed into the downtake area of the next compartment.

The cross-over ports are preferably located immediately above the calandria, and the turbulence and vigorous flow obtained in these zones keeps the cross-over ports free of encrustation.

5 A further aspect of the invention is the provision of very fine water sprays onto all surfaces extending above the normal massecuite operating level. This eliminates any build-up or encrustation on these surfaces, which can otherwise lead to the formation of lumps. Because  
10 the quantity of water sprayed through the sprays is very small, it does not affect the control of the supersaturation of the mother liquor in the massecuite and the crystallisation process is not affected.

In a further aspect of the invention, the continuous pan  
15 is provided with an integral condenser. This has the advantage of eliminating the costly steelwork and large diameter vapour piping required for conventional separate condensers.

An embodiment of the invention is described below with  
20 reference to the accompanying drawings, in which:-

Figure 1 is a plan view, partly in section of a continuous pan crystalliser according to the invention; Figure 2 is a side view of the same crystallizer; Figure 3 is an end view of the crystallizer; and

Figure 1A is a detailed plan of heating tubes in one compartment.

In the drawings a continuous pan crystallizer includes a plurality of compartments (in this case 12) as shown.

5 Seed massecuite enters the first compartment and syrup or molasses enters the crystallizer through ports 100. The massecuite passes anti-clockwise from one compartment to the next around the apparatus and leaves it through the outlet 102 (see Figure 3). The cross-

10 over ports 104, 105 between adjacent compartments (1 to 12) each have a pair of baffles 106, 108 which are located a short distance from the ports and above the level of the top of the tubes 110. One vertical edge of the baffles abuts the wall of the apparatus and the

15 other is located a short distance away from the vertical edge of the ports. Thus the massecuite leaving a compartment flows up the tubes between the baffle 108 and the compartment wall, and then through the port 105. It passes through the port and then has to

20 negotiate the second baffle 106 on the downstream side of the compartment 109, which directs the massecuite into the downtake .

It will be appreciated that the dimensions and location of the baffles will differ according to the various

25 parameters of the crystallizer and will have to be

determined with a view to obtaining optimum plug flow and direction according to pan capacity and evaporation rate.

5 The second aspect of the invention involves the installation of fine water sprays, positioned above the normal massecuite level. These sprays are so positioned as to direct a fine spray of water onto some or all of the surfaces of the compartment 109, the deflection baffles 106 and 108, and the internal surfaces of the  
10 shell of the vessel.

The third aspect of the invention is the provision of an integral condenser generally indicated by reference 112.

The condenser is attached to the top wall of the crystallizer and thereby obviates the expense of the  
15 complicated support means which would otherwise be necessary. The condenser has an injection water inlet 114 and a vacuum connection 116 and an injection water outlet 118.

The condenser is conventional, preceded by an  
20 entrainment separator 126. The rising vapour is contacted in the condenser with a downwardly directed spray of cooling water for collection in a collector 128 for removal through outlet 118.

CLAIMS:

1.

A continuous pan crystalliser including a plurality of compartments having calandria and cross-over ports, characterised by the provision of baffles located on either or both sides of the cross-over ports, and spaced  
5 away therefrom to provide a passage for the massecuite moving in the direction of the cross-over ports\_ to pass up the tubes of the calandria between the baffles and the walls of the compartments.

2.

The pan of claim 1 characterised in that the baffles are  
10 arranged for the massecuite to have at least one pass through the tubes before leaving a compartment.

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3.

The pan of claim 1 or claim 2 characterised in that the cross-over ports and baffles are arranged for massecuite which enters a compartment to be directed towards the downtake of the compartment.

4.

5 The pan of any of the above claims characterised in that the cross-over ports are located in an area of vigorous boiling just above the tube-plate.

5.

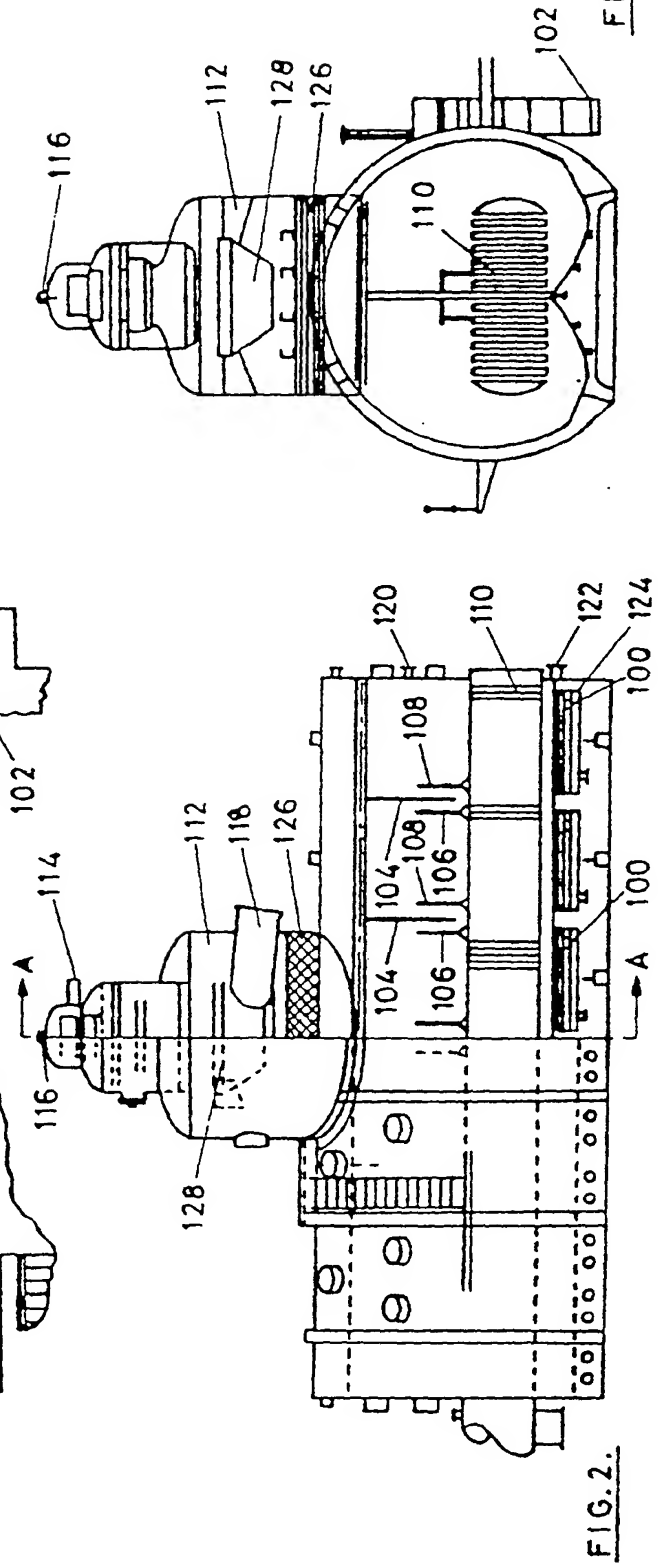
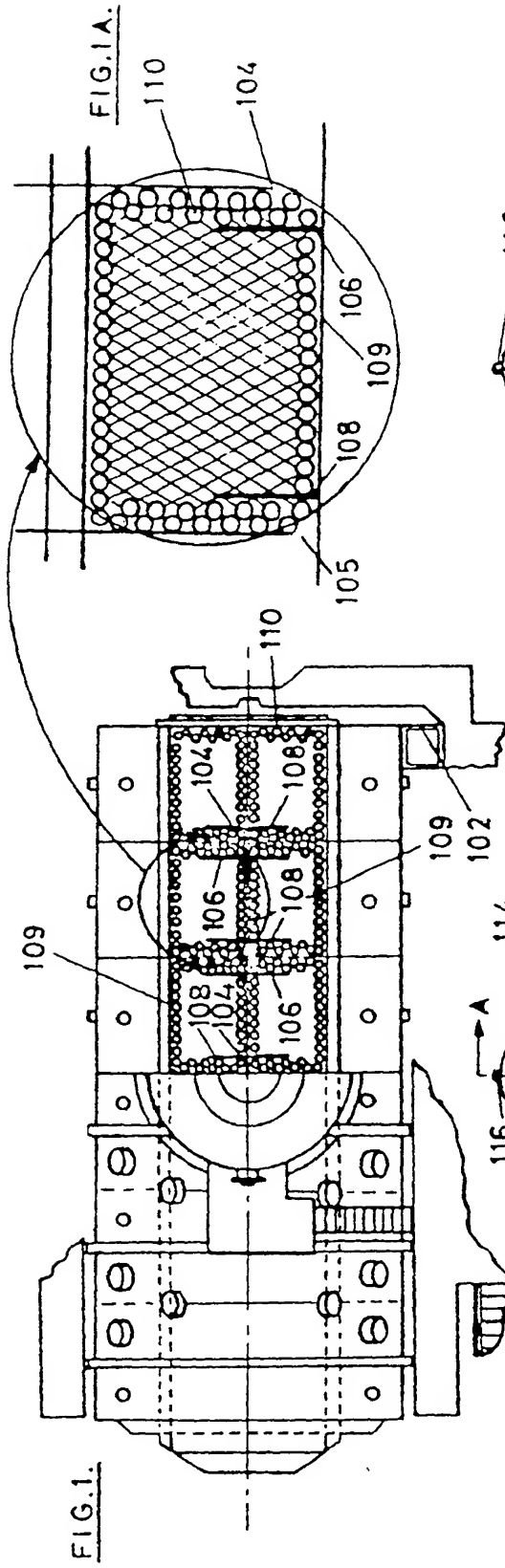
10 The pan of any of the above claims characterised in that it includes water sprays located and adapted to overcome encrustation on the baffles and sides of the pan.

6.

The pan of any of the above claims characterised in that a condenser is located integral with the pan and in direct communication with the compartments.



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# EUROPEAN SEARCH REPORT

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Application number

EP 84 30 5974

| DOCUMENTS CONSIDERED TO BE RELEVANT   |  |  |  |
|---|--|--|--|
| Category  | Citation of document with indication, where appropriate, of relevant passages                | Relevant to claim  | CLASSIFICATION OF THE APPLICATION (Int. Cl. 4) |
| X, Y  | GB-A- 378 341 (WERKSPOOR)<br>* Claims 1-4; figures 1,9; page 3, line 123 - page 4, line 63 * | 1-4  | C 13 F 1/02<br>C 13 G 1/00<br>B 01 D 9/00      |
| Y   | GB-A-1 141 639 (FIVES LILLIE-CAIL)<br>* Claim 2 *  | 1  |  |
| A   |  | 5  |  |
| A   | AU-B- 527 620 (EVANS DEAKIN)<br>* Claims 1-5; page 5, lines 16-23; page 6, lines 5-7 *       | 1-4  |  |
| A   | FR-A-2 329 317 (A.G. SKYRING)<br>* Claims 1-6; figures 1-4 *                                 | 1-4  |  |
|   |  |  | TECHNICAL FIELDS SEARCHED (Int. Cl. 4)         |
|   |  |  | C 13 G<br>C 13 F<br>B 01 D                     |
| The present search report has been drawn up for all claims  |  |  |  |
| Place of search<br>THE HAGUE  |  | Date of completion of the search<br>21-05-1985   | Examiner<br>VAN MOER A.M.J.                    |
| CATEGORY OF CITED DOCUMENTS   |  |  |  |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |  | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>O : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |  |